

REMARKS

In the last *Office Action*, the Examiner rejected Claims 4-11 and 21-25 as obvious in view of *Kirk-Othmer* or *Wansborough*. The Examiner acknowledged that *Zeyss et al.* did not disclose heat transfer between reaction streams in an integrated process and stated that "Kirk-Othmer teaches a carbonylation process for preparing acetic acid including a steam condensate and flash distillation" and that: "Wansborough teaches that stem [steam] condensate lines are routine in heat transfer systems". No other rejections are outstanding in this case.

The references fail to suggest the invention and the obviousness rejections should be withdrawn inasmuch as they are not supported by the references and are simply hindsight. Indeed, the Examiner had previously acknowledged that neither *Zeyss et al.* nor *Kirk-Othmer* suggested the invention:

The examiner notes that neither Zyess nor Kirk Othmer teach or suggest a steam condensate stream (claim 4) or a pump-around condensation loop (claim 21) for transferring heat from the production of acetic acid to one of the acetic acid stream or a purification section for purifying vinyl acetate.

Claims 4-11 and 21 are objected to for dependence on one or more rejected claims, but would be allowable if rewritten in independent form, including all limitations of intervening claims.

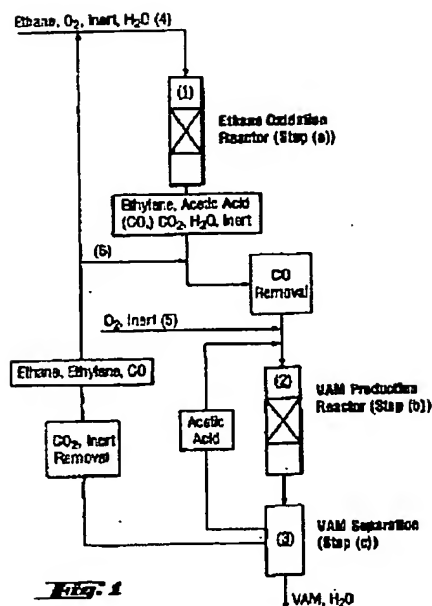
See *Office Action* of February 1, 2007 in this case, page 6.

For the removal of doubt, independent Claims 4 and 21 now recite an exothermic carbonylation process for making acetic acid and are believed most clearly allowable. The reasons for allowance are summarized below.

The present invention relates generally to integrated processes and systems for producing acetic acid and vinyl acetate wherein a portion of the heat produced during the production of acetic acid by exothermic carbonylation is transferred to the vinyl acetate production and/or purification process to facilitate production and/or purification of the vinyl acetate. The system comprises: a first reaction zone for the production of acetic acid; a second section zone for the production of vinyl acetate, wherein at least a portion of the acetic acid produced in the first reaction zone is fed to the second reaction zone; a purification section for purifying at least a portion of the vinyl acetate produced in the second reaction zone; a heating transfer system for transferring heat produced in the first reaction zone to either the acetic acid being fed to the second reaction zone or to the purification section, wherein the heat transfer comprises a steam condensate stream. In the claimed embodiments of the invention the acetic acid is produced in the first reaction zone by an exothermic carbonylation reaction. This is a more energy efficient process than any of the references since heat is generated and consumed in the processes as required, providing synergy in a hybrid processing scheme.

Zeyss et al. discloses a two stage industrial process for the production vinyl acetate; however, acetic acid is not produced by exothermic carbonylation in that reference:

8



Rather, the acid is produced by ethane oxidation which is probably not exothermic to any substantial degree; thus, no heat is available. Moreover, *Zeyss et al.* is devoid of any teaching(s) or suggestion(s) of heat transfer between the first stage and the second stage of the process.

Kirk-Othmer is the entry for "acetic acid" in the Kirk-Othmer Encyclopedia of Chemical Technology. Of this reference, only pages 123-125 are at all pertinent to the present invention. Pages 123-125 describe methanol carbonylation in general; however, this reference is also devoid of any teaching or suggestion of using the heat of reaction of methanol carbonylation to facilitate vinyl acetate production as is claimed in this case.

Wansborough (Approaches to process control problems) is directed to control schemes for industrial chemical processes, particularly steam heated, tube-in-shell heat exchangers. Here again, the reference is devoid of any teaching or suggestion of using the heat of reaction of methanol carbonylation to facilitate vinyl acetate production as is claimed in this case. *Note*, for example, the **Figure** on the second page of the article:

Heat Exchanger Control

The basic control scheme outlined above, when applied to a steam-heated, tube-in-shell exchanger, has the form shown in Fig. 2.

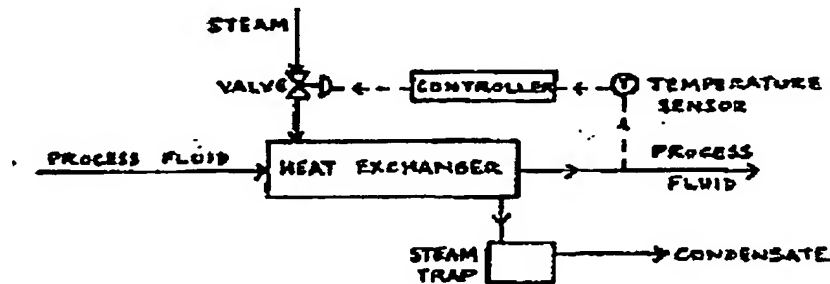


FIG 2 : BASIC HEAT EXCHANGER CONTROL SYSTEM

It is well established that an obviousness rejection is improper when the cited art does not teach each and every element as specifically claimed in the instant invention (*see* MPEP §143.03, reproduced in part below).

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974) "All words in a claim must be considered in judging the patentability. Of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 424 F.2d (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5USPQ2d 1596 (Fed. Cir. 1988).

Furthermore, the Examiner must set forth clear articulation of the reason(s) why the claimed invention would have been obvious. This is further echoed in the recent guidelines established by the Office in reaction to the recent case involving the obviousness analysis, i.e., *KSR Int'l Co. v. Teleflex Inc.*, as noted in the new guidelines entitled, "Examination Guidelines for Determining Obviousness Under 35 U.S.C. 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, Fed. Reg. Vol. 72, No. 195, Wednesday, Oct 10, 2007":

The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *in re Kahn* 441 F.3d 977,988, 78 USPQ2d 1329, 1336, (Fed.Cir. 2006) stated that “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR* 550 U.S. at 82 USPQ2d at 1396

Claim 4 is patentable because it recites “wherein the acetic acid is produced using an exothermic carbonylation reaction” and “removing at least a portion of the heat transfer system and providing at least a portion of the heat removed from the heat transfer system to at least one of the acetic acid reaction stream and the purification system for the purifying vinyl acetate, wherein the heat transfer system comprises a steam condensate stream. *Zeyss et al.* does not disclose, teach or suggest carbonylation or heat transfer to make the process more efficient. *Wansborough* is devoid of any explicit teaching or fair suggestion of a carbonylation reaction or transferring heat thereof to vinyl acetate production. Therefore, the Examiner’s rejection based on *Zeyss et al.* in view of *Wansborough* is untenable. Since Claims 5-11 depend on Claim 4, the rejection of these claims based on *Zeyss et al.* in view of *Wansborough* is likewise untenable.

Kirk-Othmer teaches that methanol carbonylation is a known means for producing acetic acid. However, it would not be obvious to substitute methanol carbonylation for ethane oxidation step of *Zeyss et al.* for at least two reasons. First, *Zeyss et al.* teaches away from using methanol carbonylation as the first stage of their invention. *Zeyss et al.* teaches [page 1, lines 10-13]: “Acetic acid produced by carbonylation generally requires extensive purification to remove *inter alia* iodides arising from the catalyst system generally employed because iodides are recognized as potential vinyl acetate catalyst poisoner.”. *Zeyss et al.* teaches [page 2, lines 12-14]: “It is an object of the present invention to provide for an integrated process for the production of vinyl acetate from a gaseous feedstock comprising essentially ethane as the only external carbon source of raw material supply...”. *Zeyss et al.* teaches [page 4, lines 8-15]: “Of specific advantage in the integrated vinyl acetate process of the present invention is that in principle infrastructures, utilities, and other features can be combined, for example only a single

feed gas compressor and off-gas scrubbing system is required whereas separate acetic acid and vinyl acetate processes each require their own gas fee compressor and off-gas scrubbing system. By combining step (a) and (b) of the present invention reduced intermediate storage requirements are needed compared to two separate processes. All these advantages lead to reduced capital and operating costs." *Zeyss et al.* fail to explicitly teach or fairly suggest the "heat transfer" or carbonylation limitations recited in Claim 4. *Kirk-Othmer* fails to explicitly teach or fairly suggest the "heat transfer" limitations of Claim 4 or the hybrid reaction scheme for making vinyl acetate. Therefore the rejection of claim based on *Zeyss et al.* in view of *Kirk-Othmer* is untenable.

Claim 5 recites that "the steam condensate stream is directed to a flash vessel maintained at a temperature of about 150°C to about 160°C". Claim 6 recites "wherein the flash vessel is maintained at a pressure of about 4.0 kg/cm. to about 5.3 kg/cm". The references are devoid of any disclosure or suggestion of these limitations.

Claims 7-11 recite, respectively, "The process of Claim 4 wherein the heat removed from the production of acetic acid is transferred from the steam condensate of the heat transfer system to : 1. a vinyl acetate azeotrope column feed steam in the purification section for purifying vinyl acetate [Claim 7]; 2. a reboil stream of light ends column in the purification section for purifying vinyl acetate [Claim 8]; 3. a reboil stream used in conjunction with a finishing column in the purification section for purifying vinyl acetate [Claim 9]; 4. the acetic acid reaction stream [Claim 10]; 5. a reboil stream of a light ends column in the purification section for purifying vinyl acetate and to reboil stream used in conjunction with a finishing column in the purification section for purifying vinyl acetate [Claim 11]." Again the references are completely devoid of and teaching or suggestion of these particulars.

Claim 23 recites, "(a) ... wherein at least a portion of the heat from the production of acetic acid is removed from the first reaction zone and at least a portion of the heat removed from the production of acetic acid is transferred into a heat transfer system; ... (d) removing at least a portion of the heat transferred to the heat transfer system and providing at least a portion

of the heat removed from the heat transfer system to at least one of the acetic acid reaction and the purification section for purifying vinyl acetate, wherein the heat transfer system comprising a pump-around condensate loop in which the heat from the production of the acetic acid is removed from the first reaction zone through heat exchange between a hot reaction solution stream and a steam condensate stream.”. The three references fail to explicitly teach or fairly suggest the above features, particularly the “pump-around steam condensate loop”.

Dependent Claims 22 and 23 recite the same limitations as Claims 5 and 6. *See* Applicant's remarks concerning Claims 5 and 6, above.

It is respectfully submitted that the rejections in this case are merely hindsight-based and should be withdrawn. The references, especially *Zeyss et al.* and *Kirk Othmer*, are fundamentally different as noted above, making that proposed combination improper. In this regard, Applicant *notes Ex parte* Willems, 84 USPQ2d 1350, 1352 (CAFC 2006) which *notes* that unlike disclosures should not be combined:

Given the disparate structures and functions of Koll's handle assembly and Willems' latch, Willems would not appear to provide any suggestion to modify the Koll handle assembly to provide a base plate to which the bracket plate is mounted and to provide raised or projecting parts, such as projecting parts 127, 128 of Willems, on such base plate to keep objects away from Koll's handle, as the examiner contends on page 4 and 5 of the answer. From our perspective, the only suggestion for modifying Koll's handle assembly in this manner is found in the luxury of hindsight accorded one who first viewed appellant's disclosure. This, of course, is not a proper basis for a rejection. *See In re Fritch*, 972 F.2d 1260, 1266, 23 USPQ2d 1780, 1784 (Fed. Cir. 1992).

Likewise, there is no motivation provided whatsoever to combine *Wansborough* and *Zeyss et al.*, making that combination improper (and incomplete in any event since carbonylation is recited in all of the independent claims). *See In re Fritch*, 23 USPQ2d 1780, 1783-4 (CAFC 1992) which is likewise *apropos*:

Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or

suggestion supporting the combination. Under section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so." Although couched in terms of combining teachings found in prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be *modified* in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board.

Here, the Examiner relied upon hindsight to arrive at the determination of obviousness. It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. This court has previously stated that "[o]ne cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

The prohibition against using hindsight is further seen in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1397 (U.S. Sup. Ct. 2007):

A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 [141 USPQ 549] (CA6 1964)).

as well as the obviousness guidelines published by the Office on October 10, 2007, Federal Register Vol. 72 No. 195, page 57529, item G:

...G. Some Teaching, Suggestion, or Motivation in the Prior Art That Would Have Led One of Ordinary Skill to Modify the Prior Art Reference or To Combine Prior Art Reference Teachings To Arrive at the Claimed Invention

To reject a claim based on this rationale, Office personnel must resolve the *Graham* factual inquiries. Office personnel must then articulate the following:

(1) a finding that there was some teaching, suggestion, or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings; ...

Here, there is no relevant teaching in the prior art as to combining or modifying the references and the obviousness rejections should be reversed for this reason.

Finally, it is noted that the present invention provides a means by which to conserve energy and reduce operating costs. Improvements in efficiency are patentable. *Note In re Wright*, 122 USPQ 522, 524 (CCPA 1959):

Though the court may have believed that each of the elements in the patented device was old, it does not follow that the combination was unpatentable. We need not elaborate upon the rule that a novel combination of old elements which so cooperate with each other so as to produce **a new and useful result or a substantial increase in efficiency, is patentable**. See *Lewyt Corp. v. Health-Mor, Inc.*, 7 Cir., 181 F.2d 855, 85 USPQ 335, certiorari denied 340 U.S. 823, 71 S.Ct. 57, 95 L.Ed. 605, 87 USPQ 432; *Blaw-Knox Co. v. Lain Co.*, 7 Cir., 230 F.2d 373, 108 USPQ 356. *Weller Manufacturing Company v. Wen Products, Inc.*, 7 Cir., 231 F.2d 795, 798, 109 USPQ 73, 75 (1956).

15

In view of the above amendments and Remarks, this application is believed in condition for allowance. If for any reason the Examiner would like to discuss this case, the Examiner is invited to call at the number listed below.

Respectfully submitted,



Michael W. Ferrell
Attorney for Applicants
Reg. No. 31,158

Ferrells, PLLC
4400 Fair Lakes Court, Suite 201
Fairfax, VA 22033-3899
Telephone: (703) 968-8600
Facsimile: (703) 968-5500
January 7, 2008